International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 04 | Apr 2019 www.irjet.net p-ISSN: 2395-0072

PERSONAL MONITORING OF BLOOD PRESSURE USING ANDROID SMART PHONES

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ABSTRACT:- Blood pressure (BP) is that the pressure exerted by current blood upon the walls of blood vessels and is one amongst the principal very important signs. When used while not additional specification, "blood pressure" typically refers to the blood pressure of the circulation, typically measured at a human higher arm. A person's blood pressure is usually expressed in terms of the systolic pressure over diastolic pressure during cardiac cycle. High force per unit area could be a common risk issue for heart attacks, strokes and aneurysms. Hypertension is mostly a lot of common, also due to the demands of modern lifestyles. Hypertension and cardiovascular disease go typically unseen attributable to infrequent observance. Getting reliable force per unit area readings isn't perpetually simple. The micro controller sends the data to the mobile phone through the wireless communication. Here we have a tendency to area unit victimization Bluetooth technology for wireless knowledge transfer. We can monitor the sensing element worth whenever the patient desires. If any abnormality occurs, then it will send an email to a person. Using mechanical man application, one will read his anamnesis date wise, event wise etc.

1. INTRODUCTION

Blood pressure (BP) is that the pressure exerted by current blood upon the walls of blood vessels and is one in all the principal very important signs. When used while not more specification, "blood pressure" sometimes refers to the blood pressure of the circulation, sometimes measured at an individual's higher arm. A person's vital sign is sometimes expressed in terms of the blood pressure over blood pressure. Blood pressure varies betting on state of affairs, activity, and disease states, and is regulated by the nervous and endocrine systems. Chronic high blood pressure may be a risk issue for several complications, including peripheral vascular disease, heart attack, and stroke. Hypertension is usually additional common, also due to the demands of modern lifestyles. Hypertension and cardiovascular disease go usually unobserved thanks to occasional watching. Getting reliable vital sign readings isn't continuously simple. So far, a blood pressure monitor can be used for this project. A device which consists of microcontroller and blood pressure sensor. Get the data from the blood pressure sensor and given to the micro controller .The micro controller send the data to the mobile phone through the wireless communication. Here we are using Bluetooth technology for wireless data transfer. Using golem application, one will read his medical record date wise, event wise etc. android application can perform data mining on a particular patient data to discover the blood pressure levels.

2. SYSTEM ANALYSES

2.1 Existing System

Globally, hypertension is a major chronic, non-communicable disease and a leading cause of death and disability. Hypertension, a sustained elevated blood pressure1 (BP), is a dangerous medical condition that stresses the heart and promotes vascular weakness and scaring, making blood vessels more prone to rupture. Uncontrolled and untreated hypertension increases the risk of coronary arteries damage, heart attack, stroke, kidney disease, eye damage and is responsible for other conditions.

2.2 Proposed System

The proposed system current BP electronic devices that enable automatic BP measurements are expensive for the users and also they can only store a small number of BP readings. These are very useful to monitor BP and heart rate (HR). The goal of this project is the development of an Android personal blood pressure monitoring application which will assist users to monitor their BP levels. It will allow them to retrieve the history of their inputs, see graphs with their BP levels and set reminders in order to use the app. The

app must provide an easy to use, friendly and simple interface designed for this particular purpose.

3. PROBLEM DESCRIPTIONS

The project was implemented using blood pressure monitor kit and the android application with hardware equipment's and software tools.

The Main Modules in the Applications are

- Wireless Personal Area Network (WPAN)
- Sensor design
- Software design
- Bluetooth and connectivity
- Bluetooth-Enabled Medical Sensors
- Blood pressure monitor

3.1 Wireless Personal Area Network (WPAN)

The WPAN is integrated by,

• Three Bluetooth-enabled sensors can be used,

• A pulse-oximeter, a single derivation ECG (electrocardiography) sensor and a blood pulse monitor.

• An Arduino module with a three-axis compass and a Bluetooth interface.

• GPS perform as the WPAN coordinator.

3.2 Sensor design

In signal is measured by the standard lead to configuration. ECG sensors are attached to user's two arms to acquire signals. Signal is weak and band limited at the range of 0.5 Hz ~ 100 Hz, the pre-processing, which includes amplification and filtration, is significant to the acquisition module pulse wave signals are sampled respectively by 12-bitsanalogue-to-digital converter (ADC) port from the MCU which is then transferred to the Android Phone through the serial Port using Bluetooth.

3.3 Software design

The main requirements for the software are,

• The interface must be easy-to-use and guide the user to take high quality BP measurements.

• The application must support different languages, especially those spoken in developing countries.

• The device must save BP measurements to a local database to provide review capabilities, and to a remote system to allow the back-up of data, device-independence, and sharing with healthcare providers.

3.4 Bluetooth and connectivity

• Bluetooth is a low power, radio frequency technology for short-range communications. It can be used to build ad-hoc networks or provide data/voice access points.

• These tests were intended to evaluate the actual connectivity capability of the Smartphone. In all the cases, the WPAN operates in an exceedingly absolutely organized mode.

3.4.1 Local mode

Under this configuration, the smart phone screen displays the fully detailed information received from the connected sensors.

3.4.2 Remote mode

For this mode, the application in the smart phone performs as a gateway between the sensors and the server and offers a simplified view of the data on its screen. Thus, it retransmits to the central control server the data received from the sensors together with GPS position information. In this sense, in the case that the Smartphone does not integrate a GPS device, the data about the user's location can be obtained from the cellular network or from an existing Wi-Fi access point, depending on availability.

3.5 Bluetooth-Enabled Medical Sensors

In order to ensure the interoperability between devices from different manufacturers, the Bluetooth standards specify BT profiles. A BT profile defines the protocols and procedures that must be implemented to guarantee the data exchange under different typical application scenarios.

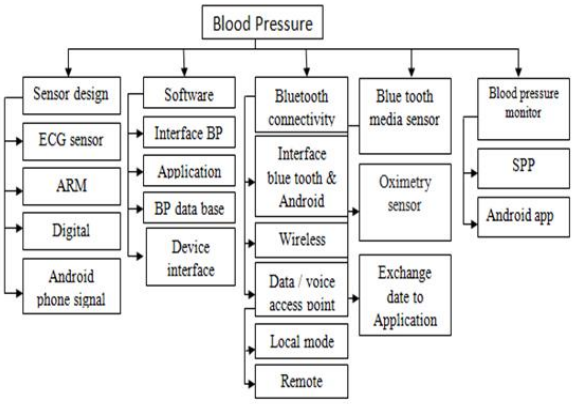
3.6 Blood pressure monitor

This model offers both SPP and dial-up Bluetooth profiles. SPP (operating as a slave) was elite for the appliance. Under this profile, the device usually

remains in a very standby mode expecting an invitation for the worth of the measured pressure.

4. SYSTEM DESIGN

4.1 System Structure



5. REQUIREMENT SPECIFICATIONS

5.1 Hardware Requirements:

Blood Pressure Sensor

It measures Blood pressure using pressure sensor and hand cuffs, and transducer to measure blood pressure and heart rate in three phases Inflation, Measurement, and Deflation. They embrace associate digital display, selection buttons, memory recall, power management, and USB interface. The digital measurements of pressure and pulse square measure performed by the micro chip. Measurements results square measure hold on in EEPROM or nonvolatile storage as an information log that may be uploaded to a computer via USB. The analog circuit is employed to amplify each the DC and AC elements of the signaling of pressure electrical device in order that we will use the MCU to method the signal and procure helpful info concerning the patient's health.

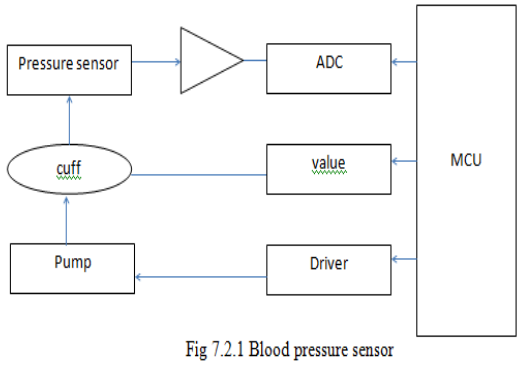


Fig 7.2.1 Blood pressure sensor

Micro controller 8051

The Intel MCS-51 (commonly noted as 8051) may well be a Harvard style, CISC instruction set, single chip microcontroller (µC) series that was developed by Intel in 1980 to be used in embedded systems. The 8051 will solely execute code fetched from program memory. Most 8051 systems respect this distinction, and then square measure unable to transfer and directly execute new programs. The strict Harvard design has the advantage of creating such systems proof against most styles of malware. Some 8051 systems have (or will be changed to have) some "dual mapped" RAM, creating them act somewhat a lot of like Princeton design.

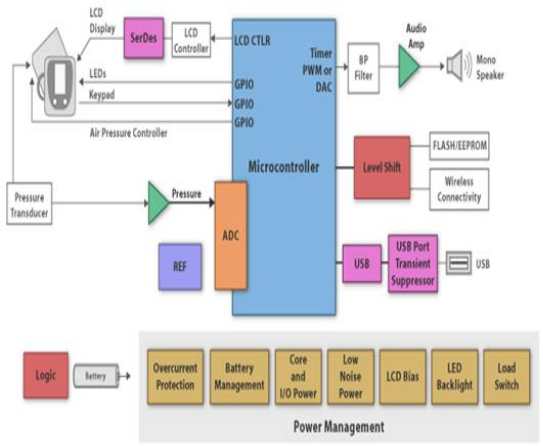


Fig 7.2.3 Block Diagram

Measurement Principle

This product uses the Oscillometric measurement methodology to notice vital sign. Before every measurement, the unit establishes a "zero point" equivalent to the atmospheric pressure. Then it starts inflating the cuff. Meanwhile, the unit detectspressure oscillation generated by beat-to-beat pulsatile, which is used to determine the systolic pressure and diastolic pressure as well as pulse rate. The device also compares the longest and the shortest intervals of detected pulse wave with the average value, and then calculates the standard deviation. The monitor will light up a warning symbol when the calculated standard deviationis larger than or equal to 15.

5.2 SOFTWARE REQUIREMENT SPECIFICATIONS

Android Feature

Messaging

SMS and MMS area unit on the market styles of electronic messaging, as well as rib text electronic messaging and mechanical man Cloud to Device electronic messaging (C2DM) and currently increased version of C2DM, mechanical man Google Cloud electronic messaging (GCM) is additionally a section of mechanical man Push electronic messaging service.

Web browser

The web browser on the market in mechanical man relies on the ASCII text file Blink (previously internet Kit) layout engine, let alone Chrome's V8 JavaScript engine. The browser scores 100/100 on the Acid3 check on mechanical man four.0.

Voice based features

Google search through voice has been on the market since initial unharness. Voice actions for calling, texting, navigation, etc. are supported on Android 2.2 onwards. As of mechanical man four.1, Google has enlarged Voice Actions with the power to speak back and skim answers from Google's data Graph once queried with specific commands. The ability to regulate hardware has not however been enforced.

Multitasking

Multitasking of applications, with distinctive handling of memory allocation, is available.

Screen capture

Android supports capturing a screenshot by pressing the facility and volume-down buttons at a similar time.

Video calling

Android doesn't support native video vocation, but some handsets have a customized version of the operating system that supports it, either via the UMTS network (like the Samsung Galaxy S) or over IP.

Accessibility

Built in text to speech is provided by Talk back for people with low or no vision. Enhancements for people with hearing disabilities are available as is other aids.

Advantages Android

• Android is platform independent, because it is Linux based open source.

• Android is easy to learn the phone, with Google's Android App Market you can download applications for free.

• Support all Google services Google services can with one operating system, namely Android.

• Install ROM modification there are many custom ROM that you can use on Android phones, and the guarantee will not harm your device.

Disadvantages of Android

• Sometimes it is slow device.

• Android Market is less control of there are malware.

• Sometimes there are many unwanted ads because it is easy and free.

• And lot of advertising. In look it doesn't interfere with the performance of the applying itself, because it typically is within the high or bottom of the application.

Features of java

Java is a high-level language that can be characterized by all of the following exhortations.

- Simple
- Object Oriented
- Distributed
- Multithreaded
- Dynamic
- Architecture Neutral

- Portable
- High performance
- Robust
- Secure

In the Java programming language, all the source code is first written in plain text files ending with the .java extension. Those source files are then compiled into class files by the Java compiler (java c). A class file doesn't contain code that's native to your processor; it instead contains computer memory unit codes - the machine language of the Java Virtual Machine. The Java launcher tool (java) then runs your application with associate degree instance of the Java Virtual Machine.

Java platform

A platform is that the hardware or package setting within which a program runs. The most well-liked platforms ar Microsoft Windows, Linux, Solaris OS and MacOS. Most platforms are often delineate as a mixture of the package and underlying hardware. The java platform differs from most alternative platforms therein it's a software-only platform that runs on the highest of alternative hardware-based platforms.

The java platform has two components

- The Java Virtual Machine.
- The Java Application Programming Interface (API)

Application programming Interface (API)

The API provides the core practicality of the Java artificial language. It offers a large array of helpful categories prepared to be used in your own applications.

The JDK provides standard mechanisms such as Java Web Start and Java Plug-In, for deploying your applications to end users.

User Interface Toolkits The Swing and Java second toolkits build it doable to form refined Graphical User Interfaces (GUIs).

Java Swing

The Swing toolkit includes a chic set of parts for building GUIs and adding interactivity to Java applications. Swing includes all the parts you'd expect from a contemporary toolkit: table controls, list controls, tree controls, buttons, and labels. Swing is way from a straightforward element toolkit, however.

It includes wealthy undo support, a extremely customizable text package, integrated internationalization and accessibility support. To truly leverage the cross-platform capabilities of the Java platform, Swing supports varied look and feels, as well as the power to make your own look and feel.

The ability to create a custom look and feel is made easier with Swing, a look and feel specifically designed to be customized. Swing would not be a element toolkit while not the essential program primitives like drag and drop, event handling, customizable painting, and window management. Customization is possible. If none of Swing's provided parts are specifically what you would like, you'll be able to leverage the essential Swing element practicality to make your own.

A Swing application is constructed from a group of heavyweight containers, a group of light-weight containers, and a hoard of GUI components. Heavyweight containers embrace something which will contain light-weight containers and parts, however cannot itself be contained. These include:

- JFrame
- JApplet
- JDialog
- JWindow

Lightweight containers, on the other hand, are containers that contain components and are themselves contained; they can be contained by a heavyweight container or another lightweight container. The more popular ones include

- JPanel
- JTabbedPane
- JSplitPane
- JScrollPane
- .

Some of the more noticeable features of Swing include,

- GUI Components (Trees, Tables, Lists, etc.)
- Look-and-feel support
- Drag-and-drop support
- Accessibility API
- Drag-and-drop support

Swing features

• Using Action Objects, we can coordinate the state and event handling of two or more components that generate action events.

• Borders are used for drawing line, titles, etc.,

• Drag and Drop or Cut, Copy and Paste method used for Data Transfer.

• Focus subsystem is used for manipulating focus.

• Swing Timer Class is used to implement threads.

Virtual machine

• A "real" machine runs machine code for that machine only.

• The JVM is a normal program for a each architecture.

• It takes Java Byte code as its input language.

• The non-native machine code input is called "interpreting".

Program portability

The Java Virtual Machine (JVM) could be a traditional program on every design. It takes Java computer memory unit code as its input language.

6. TESTING AND IMPLEMENTATION

The purpose of testing is to discover errors. Testing is that the method of making an attempt to find each conceivable fault or weakness during a work product. It provides a way to check the functionality of components, subassemblies, assemblies or a finished product. It is the method of effort computer code with the intent of making certain that the computer code meets its necessities Associate in Nursingd user expectations and doesn't fail in an unacceptable manner.

Unit Testing

Unit checking involves the look of test cases that validate that the interior program logic is functioning properly, which program input produces valid outputs. All call branches and internal code flow ought to be valid. It is the testing of the individual software units of the application. It is done once the completion of a personal unit before integration. This is a structural testing, that depends on data of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application and system configuration.

Integration Testing

Integration tests area unit designed to check integrated software package elements to see if they really run joined program. Integration testing is specifically aimed toward exposing the issues that arise from the mixture of elements.

Integration testing combines the User Blood pressure module and then the statistical structure of the BP level. If the values are imported successfully then it display statistical structure. The statistical structure of the user Bp level can be mail to a personal doctor of a person.

7. CONCLUSION

Thus in this system we get the data from the blood pressure sensor and given to the microcontroller. The microcontrollers send the data to the mobile phone through the wireless communication. By using Bluetooth technology they can monitor the sensor value continuously, for data transfer. If any abnormality occurs, then it will send a mail to a person or a relative. This project presents a sample model of answer technique for observance the pressure. It provides the answer for the patients to simply monitor their pressure by themselves. It unceasingly monitors the patient's pressure level to its non-static state.

8. FUTURE WORK

In future it will be available in play store for free download and it will add other view details of the details of the patient record and will make the our server bigger the bugs in the next development. As per the user requirement, it safety the basic needs. But this paper can be enhanced in future for image compression and performance enhancement. it can also be considered in future for accessing the patient from remote and distance location for immediate decision on the patient's by comparing present and previously store heart pulse reading.

9. BIBLOGRAPHY

1 V. Chandrasekaran, R. Dant, S. Jonnada, S. Thiyagaraja and K. Subbu, *"Cuffless differential blood pressure estimation using smart phones,"* 264 IEEETransactions on Biomedical Engineering, vol. 60, pp. 1080-1089, April 2013.

2 J. Lass, K. Meigas, D. Karai, *"Continuous blood pressure monitoring during exercise using pulse wave transit time measurement,"* Proceedings of the 26th Annual International Conference of the IEEE EMBS. San Francisco: IEEE, : 2239-2242, 2004.

3 R. Shriram, A. Wakankar, N. Daimiwal, "*Continuous cuffless blood pressure monitoring based on PTT,"* 2010 International Conference on Bioinformatics and Biomedical Technology. Chengdu : 51-55, 2010

4 D.McCombie and P. Shaltis. *"Adaptive hydrostatic blood pressure calibration: development of a wearable, autonomous pulse wave velocity blood pressure monitor,"* Proceedings of the 29th Annual International Conference of the IEEE EMBS. Lyon: 370-373, 2007

5 A.Sahoo, P. Manimegalai and K. Thanushkodi. *" Wavelet based pulse rate and blood pressure estimation system from ECG and PPG signals,"*International conference on computer, communication and electrical technology. Tamilnadu: 285- 289, 2011.

6 Infrared Data Association Serial Infrared Physical Layer Specification (V1.3).